

Introduction to compositional semantics

Lesson 2: Combining multiple machines

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1 Review

2 Composition rule 2: Predicate Modification

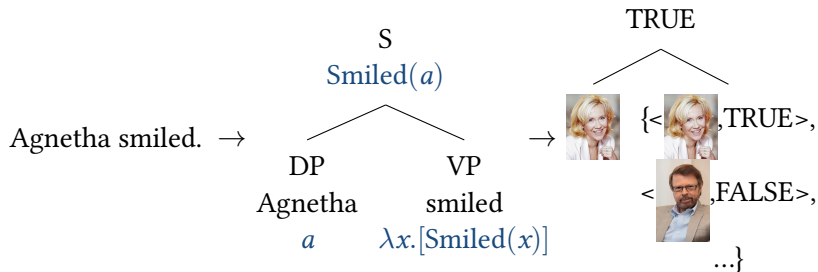
Agnetha smiled. →





The meaning of a sentence is built from the meaning of its parts.

Lambda calculus is a bridge





- To learn how to translate natural language expressions into expressions in lambda calculus.

(cf. English \rightarrow French)



- 1 Function Application
- 2 Predicate Modification
- 3 Lambda Abstraction

Suggested reading



- 1 Main reading: Coppock and Champollion (2022)
- 2 Supplementary reading: Heim and Kratzer (1998)



- I will omit very important technical details in order to develop your intuition. Refer to suggested reading for details.
- I want to encourage you to participate fully while you are in class.
 - I will not provide any model answers outside of class.
- Therefore, if you have any questions about the material presented here, ask them in class!

Ask a question!



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Putting inputs into machines



$[\lambda\text{-function}](\text{argument})$

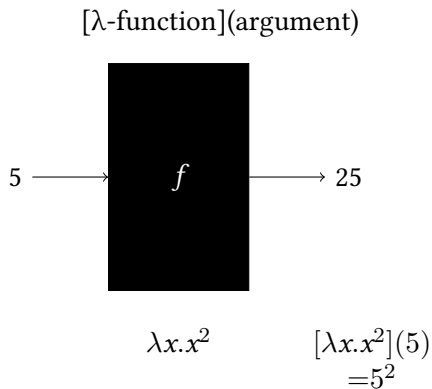


orange

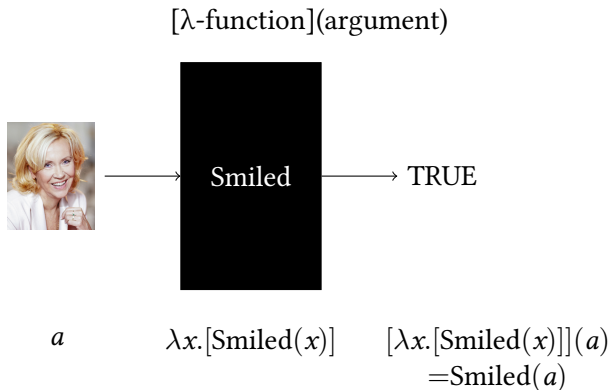
$\lambda x. [\text{Juice}(x)]$

$[\lambda x. [\text{Juice}(x)]](\text{orange})$
 $= \text{Juice}(\text{orange})$

Putting inputs into mathematical functions



Putting inputs into predicates

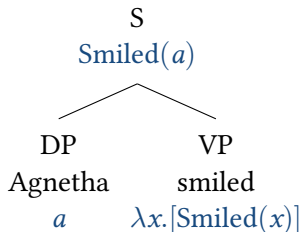


Composition rule 1: Function Application



Example: Intransitive verbs

Agnetha smiled.



Review: Function Application



Give the derivation of the following sentences:

(1) Agnetha is a singer.

(2) Björn is kind.

- 1 Draw a syntactic tree.
- 2 Give the translations for the terminal nodes.
(Assume that *is* and *a* have “no meaning”.)
- 3 Give the translations for the remaining nodes by applying Function Application.



Give the derivation of the following sentence:

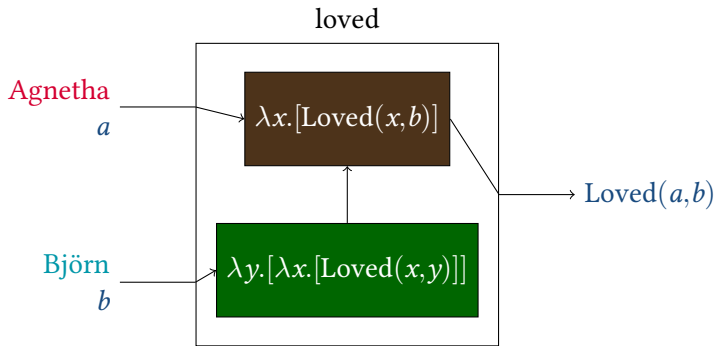
(3) Agnetha loved Björn.

- 1 Draw a syntactic tree.
- 2 Give the translations for the terminal nodes *Agnetha* and *Björn*.
- 3 Give the translation for the top node.
- 4 Give the translations for the remaining nodes. What is the translation of *loved*?

Review: Transitive verbs



Agnetha loved Björn.



Ask a question!



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Give the derivation of the following sentence:

(4) Frida is with Benny.

(Assume that *is* and *of* have “no meaning”.)

Review: Two-place adjectives



Give the derivation of the following sentence:

(5) Benny is proud of Frida.

(Assume that *is* and *of* have “no meaning”.)

Activity 1: Attributive adjectives



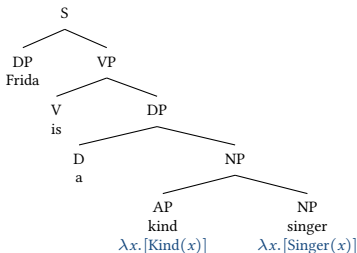
Give the derivation of the following sentence:

(6) Frida is a kind singer.

Activity 1: Attributive adjectives



Frida is a kind singer.





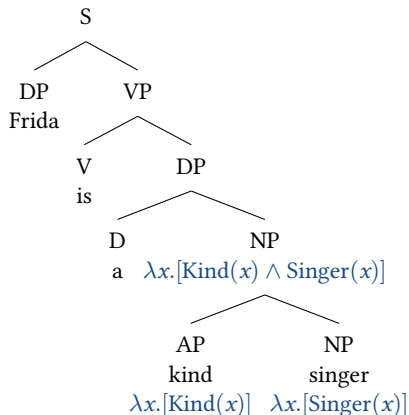
1 Review

2 Composition rule 2: Predicate Modification

Composition rule 2: Predicate Modification

Example: Attributive adjectives

Frida is a kind singer.



Activity 1: Attributive adjectives (continued)



Give the derivation of the following sentence:

(7) Frida is a kind singer.

Activity 2: Prepositional phrases



Give the derivation of the following sentences:

- (8) Agnetha is a singer in ABBA.
- (9) John is a vegetarian farmer in Texas.

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Activity 3: Adverbial modifiers



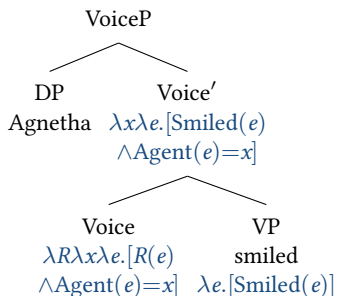
Give the derivation of the following sentence.

(10) Agnetha smiled sweetly.

What goes wrong?



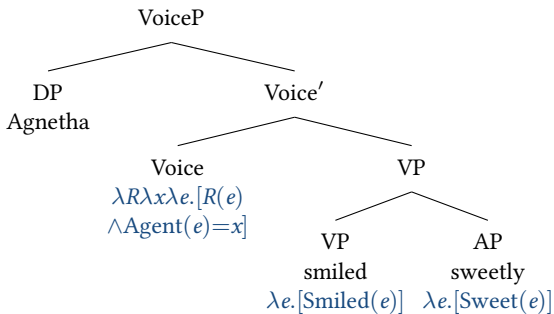
Agnetha smiled.



Activity 3: Adverbial modifiers



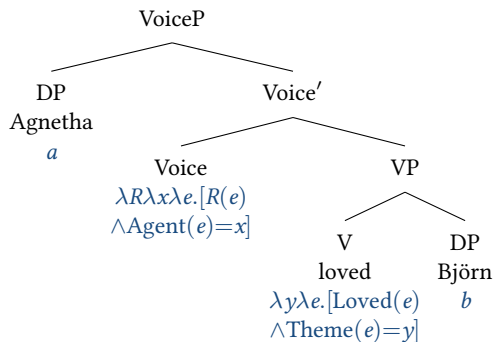
Agnetha smiled sweetly.



Activity 4: Transitive verbs



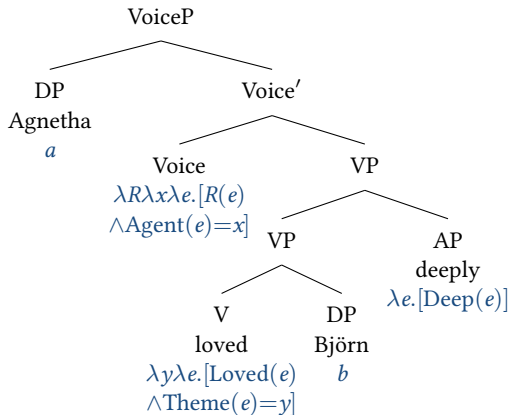
Agnetha loved Björn.



Activity 5: Putting it together



Agnetha loved Björn deeply.





- Composition Rule 1: Function Application (review)
- Composition Rule 2: Predicate Modification



Coppock, Elizabeth, and Lucas Champollion. 2022. *Invitation to formal semantics*. Ms.

<https://eecoppock.info/bootcamp/semantics-boot-camp.pdf>.

Heim, Irene, and Angelika Kratzer. 1998. *Semantics in generative grammar*. Malden, MA: Blackwell.



- Agnetha Fältskog: Stockholm Pride, CC BY 3.0
- Björn Ulvaeus: Västerviks kommun from Västervik, Sweden, CC BY 2.0
- apple: Abhijit Tembhekar from Mumbai, India, CC BY 2.0
- apple juice: City Foodsters, CC BY 2.0
- orange: Camera Eye Photography from Oshawa, Canada, CC BY 2.0
- orange juice: Geoff Peters from Vancouver, BC, Canada, CC BY 2.0
- peeler: David Carroll, CC BY 2.0
- juicer: Breville USA, CC BY 2.0

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